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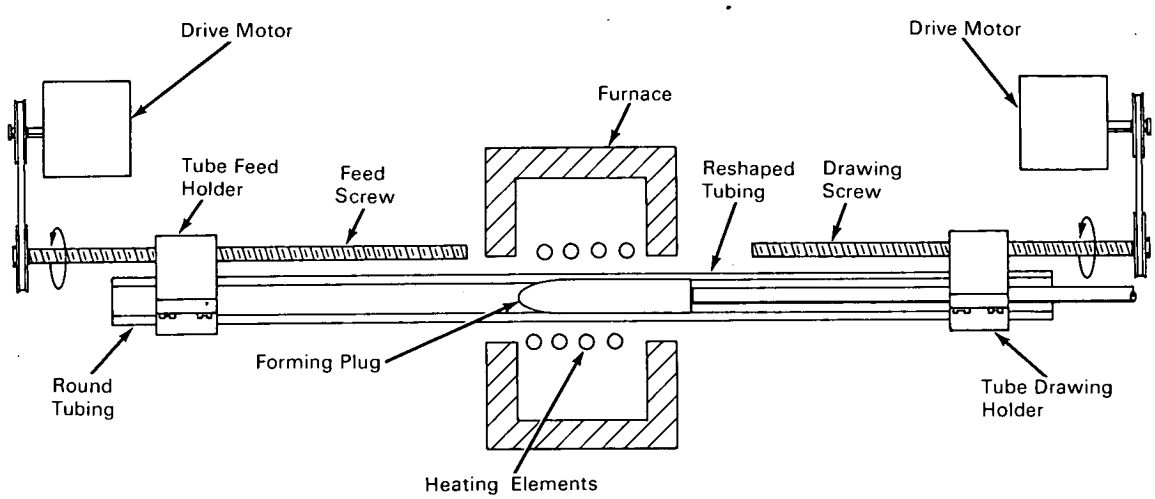
Brief 65-10235

NASA TECH BRIEF

Angular Glass Tubing Drawn from Round Tubing



The problem: To form glass tubing into shapes with other than a circular cross section. Previous methods involved the use of a combined heat source and mold. This both limited the length of tubing that could be processed in one operation and made wall thickness and uniformity difficult to control.

The solution: To draw round tubing over a shaped plug or mandrel following suitable heating of the tubing to soften the glass. In this method there is no restriction on tube length and wall thickness and uniformity are readily controlled.

How it's done: A graphite forming plug is inserted into one end of the round tubing that is to be formed. The bottom of the plug is positioned just below the hot zone of the furnace, and the tube drawing holder is attached to the end of the tubing.

As the screw of the tube drawing holder turns, it pulls the tubing over the plug after the glass has been softened in the furnace. The feed screw on the other end of the tubing turns slower than the drawing screw. The ratio of the two screw speeds determines the wall thickness of the finished tubing. The tubing flows around the plug and takes the shape of the plug. The tubing is annealed after drawing to prevent cracking. The forming plug may be made of solid graphite cut to the correct shape or may be graphite with an inner metal cooling jacket through which water circulates.

Various tubing shapes are possible in one pass through the furnace. For example, hexagonal, triangular, square, and irregular curved surfaces may be made with this method. Tubing shapes with reentrant corners such as a four-pointed star can be made in a two-step process. The tubing is first formed into a

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square in the first pass and then into a star in the second pass through the furnace.

Notes:

1. This process has been successfully used to draw irregularly shaped tubing with an original wall thickness of 0.070-inch down to a wall thickness of 0.010-inch.
2. There are many applications for inexpensive, irregularly shaped tubing. As one example, a fluorescent tube could be shaped to deliver maximum light in a specific direction.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   National Aeronautics & Space Administration
   Washington, D.C., 20546
   Reference: B65-10235

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: DeBell & Richardson, Inc.
under contract to NASA
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